The Rikers Island Hot Spotters: Defining the Needs of the Most Frequently Incarcerated

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Objectives. We used "hot spotting" to characterize the persons most frequently admitted to the New York City jail system in 2013.

Methods. We used our Correctional Health Services electronic health record to identify 800 patients admitted in 2013 who returned most since November 2008. We compared them to a randomly selected control group of 800 others admitted in 2013, by using descriptive statistics and cross-tabulations, including data through December 2014.

Results. The frequently incarcerated individuals had a median of 21 incarcerations (median duration 11 days), representing 18 713 admissions and $129 million in custody and health costs versus $38 million for the controls. The frequently incarcerated were significantly older (42 vs 35 years), and more likely to have serious mental illness (19% vs 8.5%) and homelessness (51.5% vs 14.7%) in their record. Significant substance use was highly prevalent (96.9% vs 55.6%). Most top criminal charges (88.7%) for the frequently incarcerated were misdemeanors; assault charges were less common (2.8% vs 10.4%).

Conclusions. Frequently incarcerated persons have chronic mental health and substance use problems, their charges are generally minor, and incarceration is costly. Tailored supportive housing is likely to be less costly and improve outcomes. (*Am J Public Health.* 2015;105:2262–2268. doi:10.2105/AJPH.2015.302785)

The United States has the highest rate of incarceration in the world, with a nearly 5-fold increase in the prison population since 1978[1] and approximately 6.9 million people under the supervision of adult correctional systems at the end of 2013.[2] Though the causes of this growth are complex, the "war on drugs" and "deinstitutionalization" of inpatient psychiatric hospitals have been proposed as key drivers of growth in the incarcerated population over this time. The war on drugs refers to a law enforcement approach to the problem of substance abuse that historically focused on harsh penalties for drug possession and all aspects of distribution and sale.[3] Deinstitutionalization refers to the process by which long-term psychiatric hospitals were closed with the intention of diverting mental health resources to community-based care, though the corollary expansion of these services did not occur.[4] Both the war on drugs and deinstitutionalization contribute to the de facto criminalization of 2 societal problems that also lie squarely within the purview of public health: substance use disorders and mental illness.[5–7]

Hot spotting, a practice in part inspired by targeted policing, refers to identifying and focusing on the highest users of health care services in a population and offering tailored, intensive case management in an effort to reduce costs and improve care.[8] Interventions tailored to this group have, on balance, demonstrated improved cost and health outcomes.[9–12] The high-user population identified in this manner has been shown to have high rates of mental illness, substance use, and homelessness.[13–15]

The Bureau of Correctional Health Services of the New York City Department of Health and Mental Hygiene is responsible for the provision of medical, mental health, and discharge planning services in the New York City jail system. With an average daily population of approximately 11 000 persons and more than 60 000 admissions per year, the New York City jail system is among the largest in the world. Most admissions are relatively short, with a median length of stay of approximately 13 days, though a subset of patients stays for longer periods as they go through trial. Those sentenced to less than a year serve their time in 1 "sentenced" facility on Rikers Island and those with longer sentences are transferred to New York State prisons.

All patients admitted to the New York City jail system undergo a full history and physical examination before being housed. The intake examination screens all patients for chronic medical and mental illness including substance abuse and sets the trajectory for follow-up care while incarcerated.

We sought to characterize the medical and mental health conditions of the most frequently returning persons to New York City jails. The primary goal of this investigation was to inform the care we provide for this population, but the analysis also raises questions that cut across disciplines, including the nature of our patients' relationship with the criminal justice system.

METHODS

We designed this study to better understand the patterns of incarceration and profile of the most frequently jailed persons in the New York City jail system. We were specifically interested in characterizing the demographics, medical and mental health status, and criminal justice involvement of this group as they compared with a randomly selected cross-section of the New York City jail population. Starting with all patients admitted to the jail system in 2013, we defined the frequently incarcerated group as a rank-ordered sample of the 800 most-frequently returning patients since November 2008, when the electronic health record (EHR) was implemented. This group will hereafter be referred to as the frequently incarcerated group or the hot spotters. We randomly selected a control group of

TABLE 1—Patterns of Incarceration: New York City Correctional Health Services Electronic Health Records, 2008–2014

Variable	Frequently Jailed Group (n = 800)	Control Group (n = 800)
No. of incarcerations	18 713	3 108
Mean	23.4*	3.9
Median	21	3
Range	16–66	1–17
Length of stay, days		
Mean	28*	49
Median	11	13
Range	0–656	0–962
Sum of years incarcerated	1 422.5	415.2
Cost of incarceration,[a] $	129 105 794	37 679 178
No. of days between incarcerations		
Mean	60.9*	246.2
Median	32	131
Range	0–996	0–1 851

[a]Calculation based on per day jail cost in 2011 dollars of $248.65 as used in the New York/New York III housing evaluation (John Volpe, New York City Department of Health and Mental Hygiene Bureau of Mental Health, e-mail communication, January 21, 2015).
*$P < .001$.

800 among the remainder of the same pool of individuals who had a jail admission in 2013, after we excluded the 800 most-frequently incarcerated. Once these 2 groups had been defined, analysis for each included data through 2014 for a total review period of approximately 6 years (74 months).

We extracted data on demographics as well as jail admission and discharge dates from the EHR. Though not readily available to end-users, charges are available alongside demographic data in the EHR and we extracted top charges for each individual. We categorized charges comprising less than 1% of the total into groups of related charges. We defined serious mental illness according to criteria established by the New York State Office of Mental Health.[16] We also obtained data for medical and mental health status and resource use from the EHR during the study period. We defined use as the total number of clinical staff encounters for each group divided by the total number of person-months incarcerated. We defined clinical encounters as face-to-face encounters with physicians, physician assistants, nurse practitioners, licensed clinical social workers, or nurses, excluding recurring tasks (e.g., wound care, medicine administration, blood glucose monitoring, cell-side checks). Because of changes in EHR workflow, we calculated use only for the period from April 2011 through the end of 2014. We defined Medicaid status as the most recent result of a Medicaid status query done at admission, a process implemented in August 2013. We excluded persons in the 2 groups who did not have any admissions after this date from analysis of the Medicaid status variable.

We derived categorical variables in this analysis from the EHR and these included mental health diagnosis, serious mental illness designation, gender, race/ethnicity, homelessness, drug and alcohol use, HIV status, antipsychotic medication prescription, alcohol withdrawal treatment, Medicaid status, and top charges. We defined significant drug or alcohol use as evidence of drug use excluding users of only marijuana or only alcohol (unless requiring treatment of withdrawal), whereas any drug or alcohol use includes those patients who reported use of marijuana alone or alcohol alone (regardless of need for withdrawal treatment).

We derived continuous variables from the EHR and these included length of stay, number of days between incarcerations, and number of clinical staff encounters. We calculated length of stay from jail admission and discharge dates, creating an artificial discharge date (December 31, 2014) for those persons who were still in jail at that time. In a similar way, we created time between incarcerations by calculating the days between previous discharge and subsequent admission dates. We calculated cost estimates (reported in 2011 dollars) based on the methodology employed by the New York/New York III housing evaluation, which derived daily custody and health care costs for the New York City jail system as reported in the annual New York City Mayor's Management Reports from 2005 to 2010.[17]

We used descriptive statistics, the independent t test, and cross-tabulation to explore differences between the frequently incarcerated group and the control group. We determined statistical significance of differences by using the χ^2 test with a threshold of significance defined as a 2-sided P value of less than .05. We used SPSS version 19 (IBM, Somers, NY) for statistical analysis.

RESULTS

In 2013, there were 79 618 incarcerations among 57 194 individuals in New York City jails. Among these individuals, slightly more than one third (37.3%) had only 1 incarceration since November 15, 2008, whereas 53.5% had between 2 and 7 incarcerations.

Over the 74 months of the study period, the 800 patients comprising the frequently incarcerated group experienced 18 713 incarcerations, whereas the control group had 3108, corresponding to a median of 21 incarcerations in the frequently incarcerated group and 3 in the control group (Table 1). Though the median jail stays were similar in the 2 groups (11 vs 13 days, not tested for significance), the frequently incarcerated group had shorter stays in jail with a mean of 28 days versus 49 for the control group ($P<.001$) and shorter mean intervals between stays (60.9 days vs 246.2 days; $P<.001$; Table 1). The median time between all incarcerations in the frequently incarcerated group was only 32 days. In addition, the frequently incarcerated group represented only 0.3% of all persons incarcerated during the study period, but accounted for 3.5% of all incarcerations during

TABLE 2—Demographics, Clinical Characteristics and Health Care Use: New York City Correctional Health Services Electronic Health Records, 2008–2014

Variable	Frequently Jailed Group		Control Group	
	No.	% (95% CI)	No.	% (95% CI)
Gender				
Male	709	88.6 (86.40, 90.80)	721	90.1 (88.03, 92.17)
Female	91	9.9 (7.83, 11.97)	79	11.4 (9.20, 13.60)
Race/ethnicity				
Hispanic	152	19.0 (16.28, 21.72)	261	32.6 (29.35, 35.85)
Non-Hispanic Black	581	72.6* (69.51, 75.69)	463	57.9 (54.48, 61.32)
Non-Hispanic White	48	6.0 (4.35, 7.65)	59	7.4 (5.59, 9.21)
Other or unknown	17	2.4 (1.34, 3.46)	19	2.1 (1.11, 3.09)
Mental illness				
Serious mental illness	152	19.0* (16.28, 21.72)	68	8.5 (6.57, 10.43)
Antipsychotic prescriptions	296	37.0* (33.65, 40.35)	125	15.6 (13.09, 18.11)
Homeless (missing)	409	51.5* (48.03, 54.97)	111	14.7 (12.19, 17.21)
Medicaid status[a]	724		477	
Not queried or not found	30	4.1* (2.66, 5.54)	105	22.0 (18.28, 25.72)
Ever a relationship	694	95.9* (94.46, 97.34)	372	78 (74.28, 81.72)
Active, suspended, or applied	477	68.7 (65.25, 72.15)	230	61.8 (56.80, 66.74)
Closed	198	28.5 (25.14, 31.86)	123	33.1 (28.32, 37.88)
Rejected or other insurance	19	2.7 (1.49, 3.91)	19	5.1 (2.86, 7.34)
Alcohol or drug use				
Any drug or alcohol use	795	99.4* (98.86, 99.94)	630	78.8 (75.97, 81.63)
Significant drug or alcohol use	775	96.9* (95.70, 98.10)	445	55.6 (52.16, 59.04)
Cocaine use	668	83.5* (80.93, 86.07)	243	30.4 (27.21, 33.59)
Heroin or opiate use	293	36.6* (33.26, 39.94)	178	22.3 (19.42, 25.18)
Alcohol withdrawal in jail	177	22.1* (19.22, 24.98)	35	4.4 (2.98, 5.82)
Ever in methadone maintenance	146	18.3 (15.62, 20.98)	132	16.5 (13.93, 19.07)
Medical conditions				
HIV+	85	10.9* (8.74, 13.06)	34	4.3 (2.89, 5.71)
Hepatitis C	146	18.3* (15.62, 20.98)	59	7.4 (5.59, 9.21)
Diabetes	71	8.9* (6.93, 10.87)	33	4.1 (2.73, 5.47)
Epilepsy	70	8.8* (6.84, 10.76)	43	5.4 (3.83, 6.97)

Note. CI = confidence interval. Mean age = 42 years* in frequently jailed group; 35 years in control group. No. of visits for medical services per 30 person-days = 5.6* in frequently jailed group; 4.0 in control group. No. of mental health visits per 30 person-days = 2.0* in frequently jailed group; 1.8 in control group.
[a]$P < .001$ only for those patients (n = 1201) who were admitted after August 2013.
*$P < .001$.

this time. Over the study period, the 800 frequently incarcerated persons spent 1423 person-years incarcerated at an estimated cost of $129 million.

Frequently incarcerated individuals were significantly older (42 vs 35 years), and more likely to be non-Hispanic Black (72.6% vs 57.9%), to be diagnosed as seriously mentally ill (19% vs 8.5%), to receive antipsychotic prescriptions in jail (37.0% vs 15.6%), and to have mention of homelessness in their charts (51.5% vs 14.7%; $P<.001$ for all; Table 2). In addition, the vast majority (96.6%) of the frequently incarcerated group had evidence of significant drug or alcohol use compared with 55.6% of the control group ($P<.001$). Report of any drug or alcohol use was also higher in the frequently incarcerated group (99.4% vs 78.8%) as well as crack or cocaine use (83.5% vs 30.4%), heroin or opiate use (36.6% vs 22.3%), and alcohol use requiring alcohol withdrawal treatment (22.1% vs 4.4%; $P<.001$ for all; Table 2). A higher proportion of the frequently incarcerated persons reported HIV/AIDS (10.9% vs 4.3%) and overall service use in jail was higher for medical (mean 5.6 vs 4.0 visits per month) and mental health (mean 2.0 vs 1.8 visits per month; $P<.001$ for both; Table 2). A high percentage of the frequently incarcerated persons had some relationship with Medicaid in the past (95.9%), and they were more likely to have such a relationship than the control group (78%; $P<.001$). The majority of persons in the frequently incarcerated group had a favorable Medicaid status (i.e., active, suspended, or applied; 68.7%).

When we compared criminal charges, the top (most serious) charges faced by frequently incarcerated persons were qualitatively different than those of the control group. Two charges, petit larceny (29.9%) and criminal possession of controlled substances in the seventh degree (residue or small quantity of drug; 23.8%), constituted more than half of the top charges among the frequently incarcerated group, whereas top charges in the control group were more varied. The remainder of the top charges that constituted 1% or more of all charges for the frequently incarcerated group were as follows: criminal trespass in the second degree (5.7%), theft of services (e.g., public transportation fare evasion; 5.5%), assault in the third degree (2.1%), criminal sale of a controlled substance in the third degree (1.9%), criminal possession of stolen property in the fifth degree (1.7%), criminal trespass in the third degree (1.7%), criminal possession of marijuana in the fifth degree (1.3%), criminal mischief in the fourth degree (1.1%), and resisting arrest (1.0%; Table 3). A total of 3.1% of charges were missing and the remaining 20% of charges were made up of 143 varied charges that each accounted for less than 1% of all charges. These varied charges were categorized as follows: theft or robbery (4.7%), administrative (3.6%), fraud (3.1%), disorder (2.7%), drugs (2.6%), prostitution (2.3%), violent (1.2%), weapons (0.6%) and vehicular (0.3%; Table 4). Any assault charge constituted 10.4% of the control group's charges compared with only 2.8% of the charges among the frequently incarcerated (Figure 1). A

TABLE 3—Hot Spotters' Individual Charges Constituting ≥ 1% of All Top Charges: New York City Correctional Health Services Electronic Health Records, 2008–2014

Top Charge	Percentage of Total Top Charges
Petit larceny	29.9
Criminal possession of a controlled substance in the seventh degree[a]	23.8
Criminal trespass in the second degree	5.7
Theft of services[b]	5.5
Assault in the third degree	2.1
Criminal sale of controlled substance in the third degree	1.9
Criminal possession of stolen property in the fifth degree	1.7
Criminal trespass in the third degree	1.7
Criminal possession of marijuana in the fifth degree	1.3
Criminal mischief in the fourth degree	1.1
Resisting arrest	1.0
Other or missing	24.3
Total	100

[a]Small quantity of drug or drug residue.
[b]Public transportation fare evasion.

preponderance of top charges (88.7%) in the frequently incarcerated group were misdemeanors compared with only slightly more than half (54.9%) in the control group ($P<.001$; Figure 2).

DISCUSSION

We described the basic characteristics of a population of individuals caught in the revolving door of frequent incarceration in the New York City jail system. Consistent with the literature on high users of health care services, this group had a higher prevalence of mental illness (e.g., meeting criteria for serious mental illness, receiving antipsychotic medication) compared with the overall jail population. However, less than 40% of the frequently incarcerated group fit this description. More strikingly, substance use was almost universally prevalent in this group and by many measures was more severe than in the control group. We also found evidence of homelessness in more than half the charts of these patients despite not formally screening for housing status, which makes this likely to be a significant underestimate. Finally, we noted their charges to be suggestive of persons who pose little public safety threat, with low-level theft, possession of small quantities of drugs, trespassing, and fare evasion accounting for approximately two thirds of the top charges against them. We also found a preponderance of misdemeanors and fewer assault-related charges than the control group.

Together these data present a picture of a population whose significant substance use, in conjunction with homelessness and often mental illness, promotes frequent incarceration for relatively minor transgressions. It is important that our study demonstrated a higher proportion of non-Hispanic Blacks in the frequently incarcerated group, given that mass incarceration has disproportionately affected communities of color and has been postulated to exacerbate health disparities.[18]

With the persistent lack of housing and prevalence of concomitant health issues of this population, it is unlikely that their repeated incarceration is an effective strategy from a criminal justice or public health perspective. The 4 basic principles generally used to justify incarceration are retribution, rehabilitation, deterrence, and incapacitation (separation from the public).[19] Repeated incarceration has failed to modify the behavior that is leading to recurrent arrest, suggesting that this is not an effective strategy for rehabilitation. Our clinical experience with this group leads us to believe that they have acclimated to jailing over the years such that jailing no longer serves as retribution (as it is not perceived as punishment) and does not have a significant deterrent effect on their future behavior. Their minor charges suggest that separation from the public is not necessary for this group, nor is it achieved as they spend most of their time in the community. Incarceration does not address broader social issues in the community, such as poverty, homelessness, and lack of effective access to medical and mental health care and thus may serve to propagate rather than interrupt a cycle of maladaptive behavior.

There is little public health value to repeated incarceration of this group, as jail carries significant risks to health and has not been shown to improve behavioral health outcomes. Detoxification alone does not represent adequate treatment of substance use disorders,

TABLE 4—Hot Spotters' Top Charges Constituting < 1%, by Category: New York City Correctional Health Services Electronic Health Records, 2008–2014

Top Charge	Percentage of Total Top Charges
Theft or robbery[a]	4.7
Administrative[b]	3.6
Fraud[c]	3.1
Uncategorized or missing	3.1
Disorder[d]	2.7
Drugs[e]	2.6
Prostitution[f]	2.3
Violent[g]	1.2
Weapons[h]	0.6
Vehicular[i]	0.3
Total	24.2

[a]Grand larceny, robbery, burglary, etc.
[b]Administrative code, criminal contempt, bail jumping, etc.
[c]Criminal possession of a forged instrument, fraudulent accosting, tampering with physical evidence, etc.
[d]Disorderly conduct, menacing, obstructing governmental administration, etc.
[e]Criminal sale of marijuana, criminal possession of a controlled substance, criminal sale of a controlled substance, etc.
[f]Prostitution, loitering for the purpose of engaging in a prostitution offense, patronizing a prostitute, etc.
[g]Murder, rape, assault, etc.
[h]Criminal possession of a weapon, various degrees.
[i]Unauthorized use of a vehicle, operating a motor vehicle while intoxicated, illegal possession of a vehicle identification number, etc.

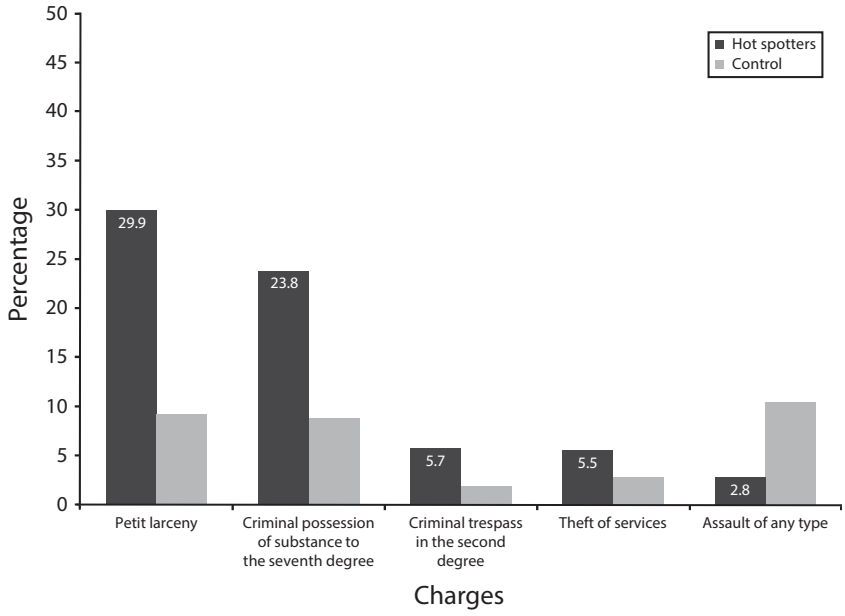

FIGURE 1—Most common top charges and pooled assault charges: New York City Correctional Health Services electronic health records, 2008–2014.

and the risk of death in the immediate post-release period is known to be increased, driven largely by overdose risk.[20,21] Periods of abstinence following incarceration have been shown to be shorter than those following treatment.[22] The stressful jail environment can lead to mental health decompensation, and suicide is a leading cause of death in jails and prisons.[23–25] Violence is prevalent in jail, including traumatic brain injury, which may potentiate behavioral problems and substance use.[26,27] Moreover, self-harm is common in jail and is promoted by features of the jail environment such as solitary confinement.[28] Jails have been shown to drive the community-level epidemiology of some communicable diseases, with the highest incidence among the frequently incarcerated.[29–32] Still, patients in the New York City jail have free and robust access to medical and mental health care. Whether the intervention as a whole is health-promoting depends on whether the value of the access to care outweighs the health risks of jail. This remains an active area of inquiry.[33,34] Regardless, the health-promoting aspects of the jail intervention could be replicated more efficiently in settings with fewer attendant health risks. The huge costs associated with the security apparatus ensure that jail represents the most expensive setting to provide these interventions, demonstrated by the estimated $129-million cost of incarceration for this group over the study period, which equates to more than $161 000 per person over 6 years.

Supportive housing interventions tailored to serve similar populations have been shown to reduce incarceration, reduce homeless shelter

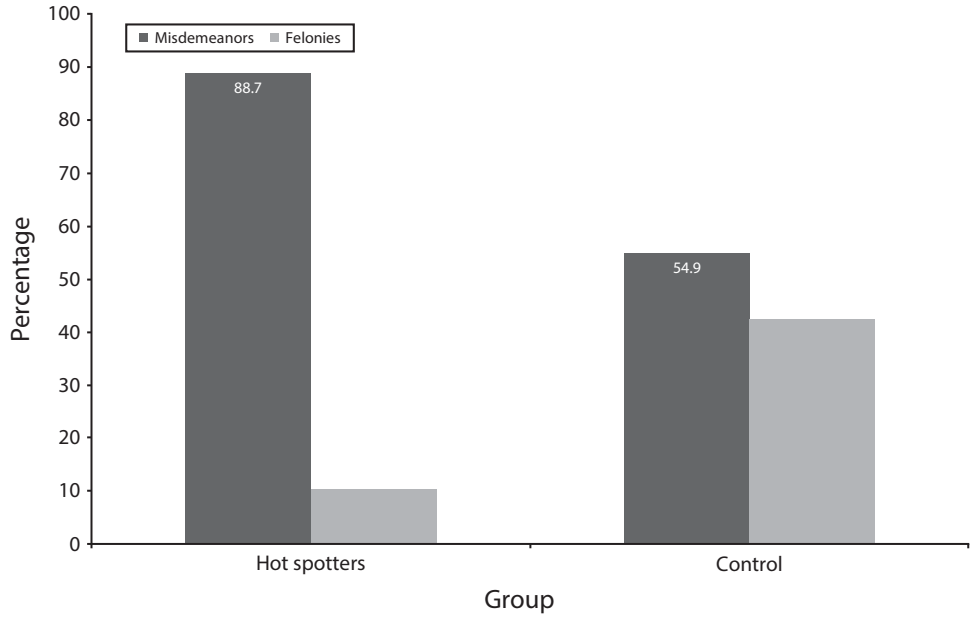

FIGURE 2—Top charges, misdemeanors versus felonies: New York City Correctional Health Services electronic health records, 2008–2014.

use, improve substance use indicators, reduce medical and psychiatric hospitalization, and cost less than usual care.[17,35] We have demonstrated that frequent incarceration is associated with homelessness, minor charges, and the key comorbidities that define eligibility criteria typically used in supportive housing interventions, namely substance use and mental illness. The frequently incarcerated group defined here shared clinical characteristics with populations targeted for supportive housing interventions, but this group had many more incarcerations than those in the supportive housing study populations to date, which suggests that even more pronounced cost savings may be possible.[17,35]

Thus, we would argue that the most frequently returning jail cohort should be specifically targeted for supportive housing and that the criminal justice system should have tools to divert this group to housing rather than send them to jail for minor charges. This would represent a novel approach to supportive housing, which generally relies on broad categories of eligibility rather than targeting a cohort of previously identified individuals deemed to be at highest need. A targeted approach would ensure that barriers to entry for this group (disabling substance use, mental illness, frequent incarceration itself) would not preclude them from access in favor of other, better compensated individuals who also meet eligibility criteria, but may be better equipped to successfully apply for supportive housing. Though they pose little public safety risk, they likely have other barriers to retention in housing that will require interventions with intensive services. This group may be entrenched in the so-called "institutional circuit" with custodial institutions purportedly meant to address their underlying problems (jails, hospitals, shelters, drug treatment centers, etc.) instead promoting continued homelessness by providing a rotating host of temporary housing solutions that functionally become permanent.[36] Interventions targeting this group should have a specific goal of interrupting this cycle by promoting permanent housing and minimizing interventions (especially jailing) that may reinitiate the cycle.

Programs and policymakers must take into account that these patients will continue to struggle with their substance use,[22] such that zero-tolerance policies will not be successful in achieving cost savings or health benefits for this population. A shift in expectations will also be required of the criminal justice system, which has traditionally employed urine drug screening as part of probation or parole strategies. Strategies that focus on functional status will be more effective at measuring progress for this group than those that focus on complete abstinence.

Next steps in the investigation of potential interventions for the frequently incarcerated include assessing the level of contact this group has had with supportive housing to date as well as conducting qualitative interviews to explore their life circumstances and trajectory. We also plan to explore patterns of incarceration among this group to potentially identify patients earlier on the trajectory toward frequent incarceration and perform a more sophisticated analysis of their charges. At the same time, the Bureau of Correctional Health Services will participate in efforts for diversion of these patients from jail to treatment by leveraging several new initiatives under way in New York City.[37] ■

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Contributors

R. MacDonald developed the concept and led article writing and revision. F. Kaba managed the data analysis with the assistance of Z. Rosner, A. Vise, D. Weiss, M. Brittner, and M. Skerker. H. Venters and N. Dickey contributed to article revisions and writing.

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Human Participant Protection

This study was deemed to be exempt from institutional review board review as research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that participants cannot be identified, directly or through identifiers linked to the participants.

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